DETAILED DESCRIPTION OF THE INVENTION

This invention pertains to a new vehicle differential. The new differential having these advantages :

(1) an all gear drive system,

(2) continuous drive means to each drive axle/wheel,

(3) forced / allowed ,inversely proportional rotation variability between axle sections ; only when needed,

(4) anti roll-back means of the drive wheels / axle sections on an inclined drive surface,

(5) also having dual internal driving means to each drive axle section / wheel.

The said new differential shown in the drawing, is herein described.

The housing 25, (shown fragmented) is the outermost support element of the said; new differential. The end plate 20, is affixed to the case 8, by bolts 28, and 30. The differential case 8; being rotatively supported,and axially supported in the said housing 25; by way of the outwardly protruding axial stock of case 8. The said new differential; being rotated by way of the crown gear 24,shaft 23, and gear 22. Gear 22; being splined to the shaft 23. Shaft 23; being rotatively supported by the housing 25. The case 9; being axially, and rotatively supported by the case 8; by way of the protruding end support stock of case 9, and the bearing 26. The case 9; being supported also, by way of bevel gear 11, and shaft 19.

The said bevel gear 11; being axially affixed/splined to the case 9. The bevel gear 11; being axially supported and rotatively supported by way of the bearing 21 and the shaft 19. The shaft 19; by way of it's end support stock 2; is axially supported and stationary to the case 8; by way of the support member 1. The support member 1 (shown with a circular invisibility line) is affixed/stationary to the case 8. Pinion shafts 3 and 4; are stationary to case 8; by way of case 8 and the said support stock 2; of shaft 19. The axle shaft 5; being entered and supported rotatively through / by the central stock of case 8, support 1, and shaft 19. The final resting place of axle shaft 5; being the central inside wall of case 9. The bevel gear 12 is splined/stationary to the axle shaft 5. The bevel gear 12; being axially and rotatively supported in the case 8; by way of the bearing 27 and the extended support stock of the said bevel gear 12. The bevel gears 13 and 14; being rotatively stationary to the case 8; by pinion shafts 3 and 4. The bevel gears 13 and 14; being in continuous engagement contact with the bevel gears 11 and 12. The axle shaft 10; being axially splined/stationary to the extended support stock of the case 9. The gear 6 is axially splined/stationary to the end of axle shaft 5. The gear 7 is axially splined to the end of shaft 19. The shafts 17 and 18 are stationary to the case 9 and parallel to the axis of the said case 9. The gears 15 and 16; have the same function / purpose.
The gear 15 is axially and rotatively stationary in the case 9; by way of shaft 17.
The gear 16 is axially and rotatively stationary in the case 9; by way of the shaft 18.
The gears 15 and 16 are orbitally engaged to the gears 6 and 7.

Wherein the said new differential is being rotated in the direction indicated in the drawing, and

(a) wherein rotation variability, between axle sections is needed; due to drive path curvature (when referred to; axle section / sections, also includes the drive wheel , of the axle section / sections referred to).

Wherein the axle section of axle 5, and gear 6, is rotating slower than the drive case 8; due to external force. The gear/gears; 15 /16, will herein be forced to rotate inversely proportional over / around gear 7. Thus causing the axle section of axle 10, to also rotate inversely proportional; relative to the axle section, of axle 5.

Wherein the axle section of axle 5, and gear 6, is rotating faster than the drive case 8; due to external force. The gear/gears; 15 /16, will herein be forced to rotate inversely proportional over / around gear 7. Thus causing the axle section of axle 10, to also rotate inversely proportional; relative to the axle section, of axle 5.

(b) wherein the axle section of axle 10, has complete traction, and complete rotation resistance and the axle section of axle 5; having neither. The axle section of axle 10; being / beginning at 0 rpm.

The said new differential is designed to automatically go into a gear-locking effect / mode. The above said axle section, of axle 10; being / beginning at 0 rpm. Herein; the gear / gears 15 /16; being stationarily rotative. Therefore the gears 7, 6, and 12, are caused / forced to rotate at the same rpm as the drive case 8. Thus preventing rotation of the gear / gears 13 /14, on their respective shafts 3 /4. Therein also preventing the independent rotation ability of gear 11, and it's axle section / axle 10. Herein both axle sections, are forced to rotate at the speed as case 8.

(d) wherein the axle section of axle 5, has complete traction, and complete rotation resistance; and the axle section of axle 10, having neither. Herein the axle section of axle 5; being / beginning at 0 rpm .

In the above said circumstance, the said; new differential is designed to automatically go into a gear-locking effect / mode. Whereas gear 6, of axle 5, is also at 0 rpm. Herein the gear 7; of shaft 19, and drive case 8, will try to rotate the case 9, by way of the gear / gears 15 /16; but in an opposing direction to that of drive case 8. Whereas gear 12, of axle 5, is also at 0 rpm; the gear / gears 13 /14 , will try to rotate the case 9, by way of gear 11; but in the same direction as the drive case 8.
Herein, two different drive forces / members are acting on the same driven member; and at the same time. Hereby causing the afore said; gear-locking effect / mode.
Each axle section ; hereby is forced to rotate at the same rpm as the other axle section, and the case 8.

(e) wherein traction is lost by one of either axle section; on an inclined drive surface. Herein a situation called; " vehicle roll-back " could occur.

The afore mentioned gear-locking effects / modes; will prevent loss of momentum of the axle section that has traction. This said new differential is designed; and the axle sections integrated in such a way; that equaled drive rotation resistance is caused; one axle section to the other.

Safety is an inherent advantage of the said; new (p.a.c.t.) differential.
"Fish-tailing"; due to sudden drive surface traction of an over accelerated drive wheel, is preventable.